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**M.Sc. (Part-II) (Semester-III) (CBCS)**  
**Examination, April-2019**  
**ORGANIC CHEMISTRY**  
**Organic Reaction Mechanism (Paper - IX)**  
**Sub. Code : 60840**

Day and Date : Monday, 1 - 04 - 2019  
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 80

- Instructions :
- 1) Attempt in all five questions.
  - 2) Section-I is compulsory.
  - 3) All questions carry equal marks.
  - 4) Answer to the all questions (Section-I,II,III) Should written in the same answer book.
  - 5) Figure to the right indicate marks.
  - 6) Attempt at least two questions from section-II and any two questions from Section-III.
  - 7) Use of log table and calculator is allowed.

**SECTION-I**

Q1) Answer the following. [16]

- a) What are Norrish type I reactions?
- b) Why does reaction of benzophenone with cis-stilbene results in the dimerization instead of oxetane formation?
- c) What do you mean by Di-Pi methane rearrangements?
- d) Mention the name of any one compound used for photoreduction of ketones.
- e) Draw the LUMO of 1,3,5-hexatriene for photochemically induced reaction conditions.
- f) Which sigmatropic rearrangement is involved in Cope rearrangement?
- g) Write the structures of any two nitrogen ylides.
- h) Write a reaction confirming that Diels-Alder reactions are stereospecific?

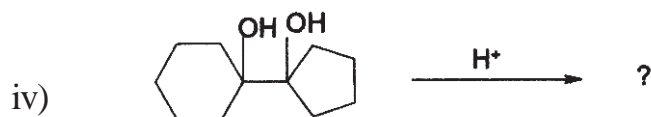
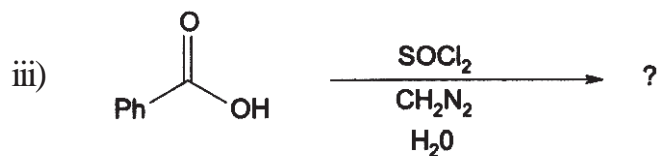
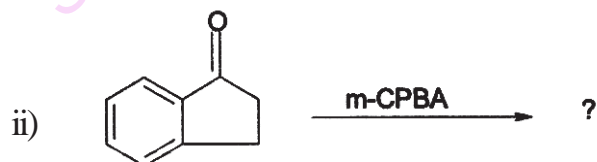
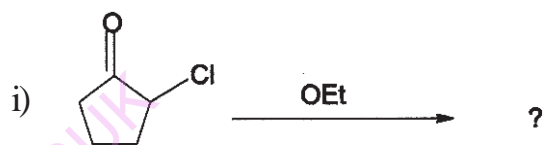
*P.T.O.*

- i) Which technique is used to confirm exact bond cleavage during hydrolysis of esters?
- j) State True or False: Dimerization of cyclopentadiene is an example of 2<sup>nd</sup> order reaction.
- k) Give an example of reversible reaction.
- l) What is an activated complex.
- m) Define exactly the term "reaction mechanism".
- n) Why does the rate of reaction usually increase with increase in temperature?
- o) What is Wolff rearrangement?
- p) Which reaction is commonly employed for the synthesis of lactones?

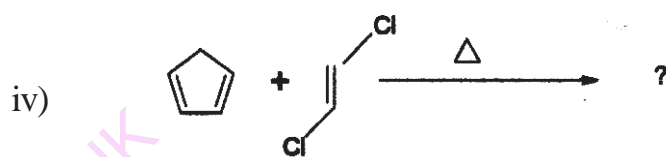
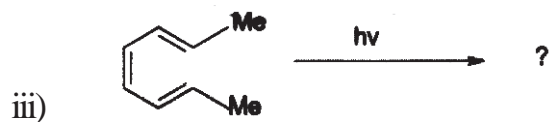
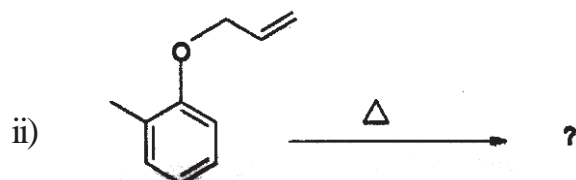
### SECTION - II

- Q2) a)** Explain the following non-kinetic methods employed for determining reaction mechanism. [8]
- i) Trapping of intermediates
  - ii) Cross-over experiments
  - iii) Evidence from reaction catalysis
- b)** Describe the study of following reactions by kinetic methods used for determining reaction mechanism: [8]
- i) Reversible reactions
  - ii) Third order reactions
- Q3) a)** What are phosphorus ylides? Explain their applications in organic synthesis. [8]
- b)** Explain the following: [8]
- i) Favorskii reaction
  - ii) Dienone-Phenol rearrangement

Q4) a) Write the products of following reactions giving suitable mechanism.[8]



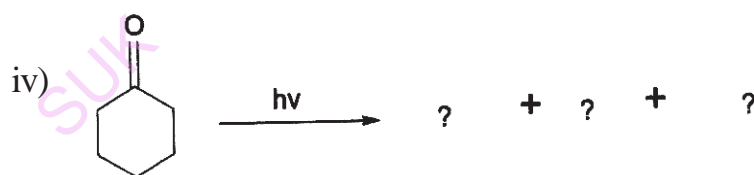
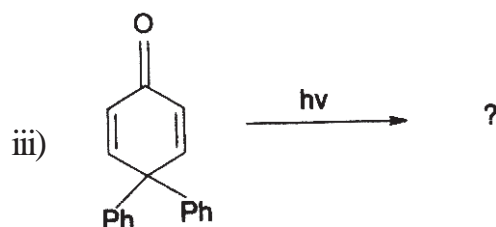
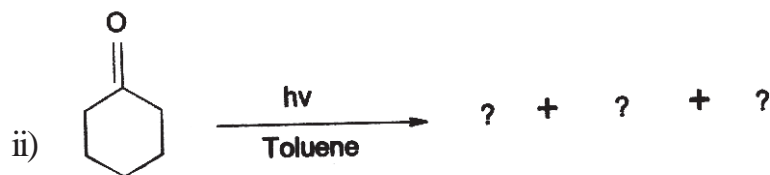
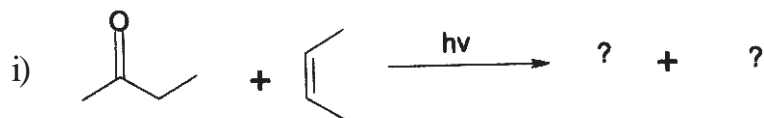
b) Write the products of the following reactions. Identify the pericyclic reaction involved in each case. [8]



SECTION - III

**Q5) a)** Explain the photo-addition of carbonyl compounds with olefins in the synthesis of oxetanes. [8]

b) Predict the products giving suitable mechanism. [8]



**Q6) a)** Explain the correlation diagram for Diels-Alder reaction. [8]

b) Derive Woodward-Hofmann rules for electrocyclic reactions with a suitable example. [8]

**Q7)** Write notes on any four. [16]

- Photodimerization reactions.
- Steady state approximation in conjugative reactions.
- Baeyer-Villiger oxidation.
- Sulphur ylides.
- Norrish type II reactions.



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Total No. of Pages : 4

M.Sc. (Part - II) (Semester - III) Examination, November - 2019

ORGANIC CHEMISTRY (CBCS) (Paper - IX)

Organic Reaction Mechanism

Sub. Code : 60840

Day and Date : Friday, 08 - 11 - 2019

Total Marks : 80

Time : 11.00 a.m. to 02.00 p.m.

- Instructions :
- 1) Attempt in all five questions.
  - 2) Section - I is compulsory.
  - 3) All questions carry equal marks.
  - 4) Answer to the all questions (Section - I, II, III) should written in the same answer book.
  - 5) Figure to the right indicate marks.
  - 6) Attempt at least two questions from Section - II and any two questions from Section - III.
  - 7) Use of log table and calculator is allowed.

**SECTION - I**

Q1) Answer the following : [16]

- a) Enlist three types of pericyclic reactions.
- b) Mention any two photosensitizers.
- c) Why gamma-H is abstracted during Norrish type II reactions?
- d) Mention the name of any one compound used for photoreduction of ketones.
- e) Draw the HOMO of 1,3,5-hexatriene for thermally induced reaction conditions.
- f) Mention any one reaction involving [3,3] sigmatropic rearrangement.
- g) What is singlet oxygen?
- h) What type of bonding is present in phosphorus ylides?

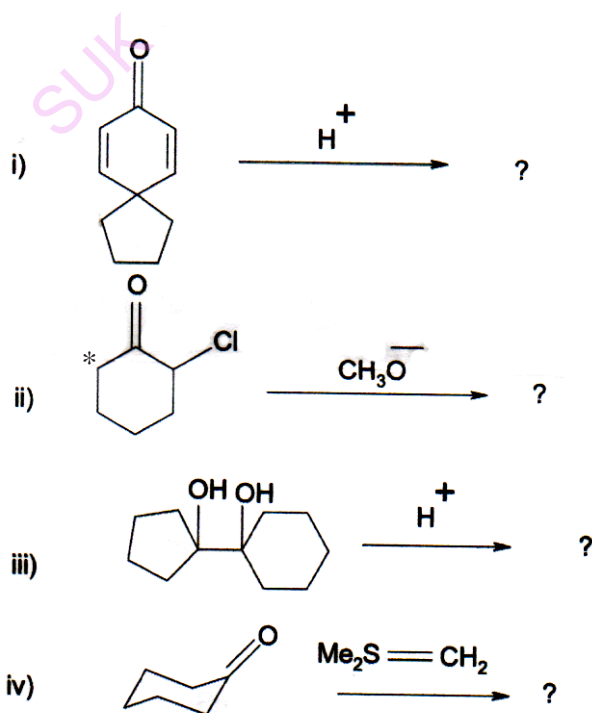
P.T.O.

- i) What are cycloaddition reactions?
- j) Write the rate equation for the first order reactions.
- k) What are parallel reactions?
- l) Define activated complex.
- m) Give an example of isotope labelling technique.
- n) Write the structures of any two sulfur ylides.
- o) What is Smiles rearrangement?
- p) Mention the name of most commonly used per acid for Baeyer-Villiger oxidation.

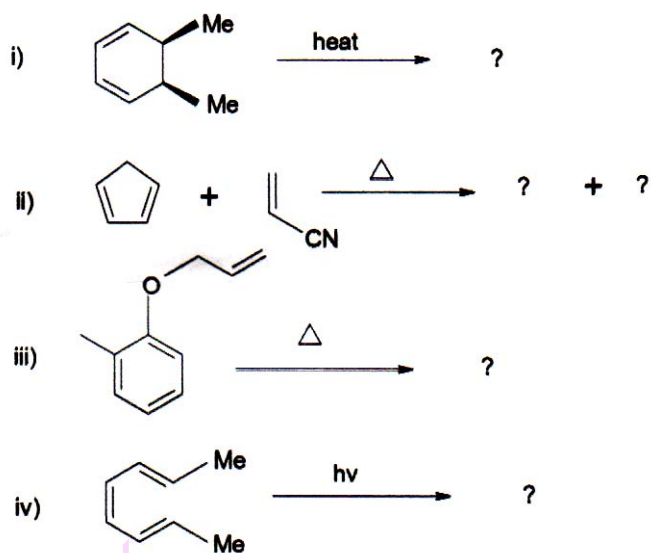
### SECTION - II

- Q2)** a) Explain the following non-kinetic methods used for determining reaction mechanism. [8]
- i) Cross-over experiments.
  - ii) Testing of possible intermediates.
  - iii) Isotope labelling.
- b) Describe the study of following reactions by kinetic methods used for determining reaction mechanism : [8]
- i) Reversible reactions.
  - ii) Second order reactions.
- Q3)** a) Explain the synthetic utility of phosphorus ylides in organic synthesis. [8]
- b) Explain the following : [8]
- i) Dienone-Phenol rearrangement.
  - ii) Baeyer-Villiger oxidation.

Q4) a) Write the products of following reactions giving suitable mechanism. [8]

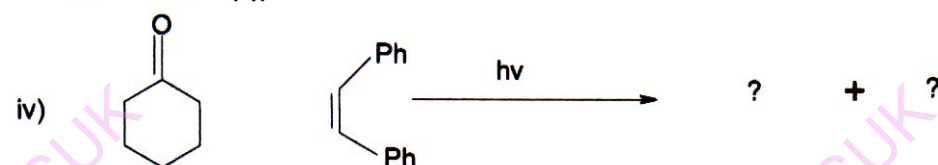
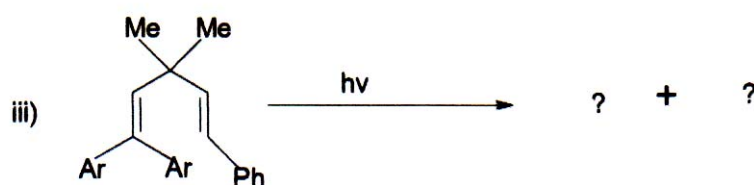
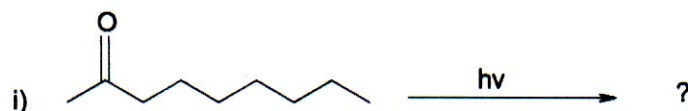


b) Write the products of the following reactions. Identify the pericyclic reaction involved in each case. [8]



SECTION - III

- Q5) a) Explain Paterno-Buchi reactions giving suitable examples. [8]  
 b) Predict the products giving suitable mechanism. [8]



- Q6) a) State the Woodward-Hofmann rules for electrocyclic reactions and discuss its application to  $[4n+2]$   $\Pi$  electron systems. [10]  
 b) What are sigmatropic rearrangements? Give an account of Cope rearrangement. [6]

Q7) Write notes on **any four** : [16]

- Norrish type II reactions.
- Trapping of intermediates.
- Wolff rearrangement.
- Nitrogen ylides.
- Photoreduction of ketones.





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**M.Sc. (Part - II) (Semester - III) (CBCS) Examination,  
November - 2019**

**ORGANIC CHEMISTRY (Revised)**

**OCH 3.1 : Organic Reaction Mechanism (Paper - IX)**

**Sub. Code : 74995**

**Day and Date : Friday, 08 - 11 - 2019**

**Total Marks : 80**

**Time : 11.00 a.m. to 02.00 p.m.**

- Instructions :**
- 1) **Question No. 1 is compulsory.**
  - 2) **Select any two questions from each section.**
  - 3) **Answer to the all questions must be written in the same answer book.**
  - 4) **All questions carry equal marks.**
  - 5) **Figures to the right indicate full marks.**

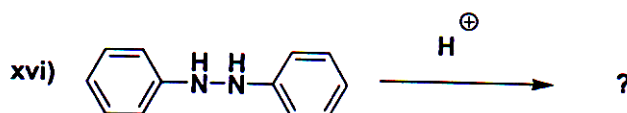
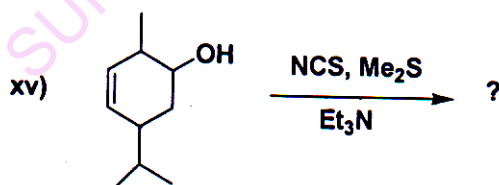
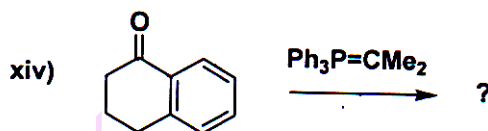
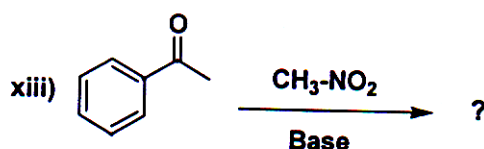
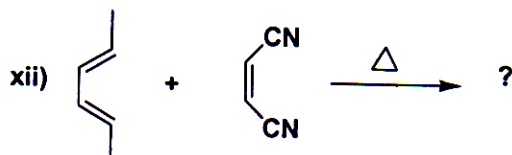
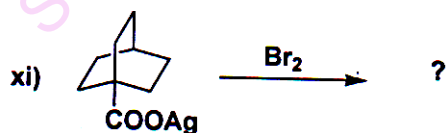
**Q1) a) Answer the following : [16]**

- i) **What is Sandmeyer reaction?**
- ii) **Which method is used to know whether reaction is intermolecular or intramolecular rearrangement?**
- iii) **Mention any two photosensitizers.**
- iv) **Which method can be used to know the exact bond cleavage during hydrolysis of esters?**
- v) **Which metal is most commonly used for alkyne metathesis reactions?**
- vi) **Mention two factors that decided the stereochemical outcome of electrocyclic reactions?**
- vii) **What is kinetic isotope effect?**
- viii) **State True or False: Corey-Chaykovsky reaction involves sulfur ylides.**

**P.T.O.**

- ix) Draw the HOMO of 1, 3, 5-hexatriene under thermal conditions?  
 x) Which sigmatropic rearrangement is involved in Ene reaction?

b) Write the products of the following reactions.



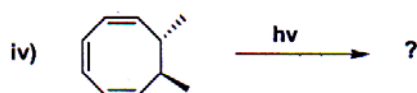
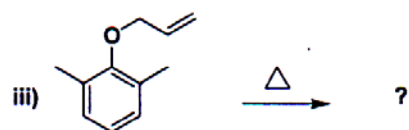
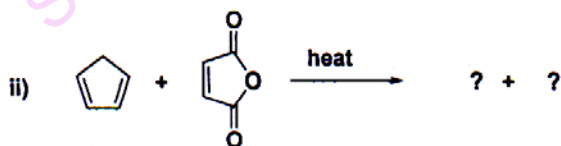
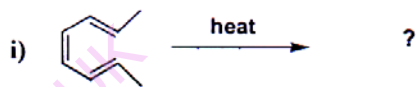
### SECTION - I

Q2) Elaborate various kinetic methods of determining reaction mechanism. [16]

Q3) a) Explain the correlation diagram for electrocyclic reaction with suitable example. [8]

b) Describe [4+2] cycloaddition reaction by using FMO approach. [8]

Q4) a) Write the products of following pericyclic reactions giving necessary selection rule. [8]



b) Give an account on Hammett equation? Explain the significance of sigma and rho values. [8]

### SECTION - II

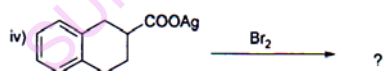
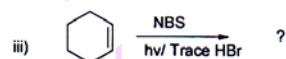
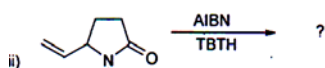
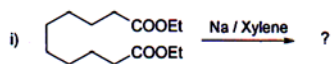
Q5) a) What are phosphorus ylides? Explain the synthetic utility of phosphorus ylides. [8]

b) Explain the following reactions. [8]

- i) Weinreb ketone synthesis
- ii) Corey-Kim oxidation

Q6) a) Explain the mechanism of the Acyloin condensation and autooxidation reaction. [8]

b) Write the products giving mechanism: [8]



Q7) Write notes on (any four) :

- a) Cross-over experiments
- b) Nitrogen ylides
- c) Sigmatropic rearrangements
- d) Coupling of alkynes
- e) Alkyne metathesis reaction



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**M.Sc. (Part - II)**  
**Examination, April - 2019**  
**ORGANIC CHEMISTRY**

**Reaction Mechanism and Theoretical Organic Chemistry**  
**(Paper-V)**

**Sub. Code : 49593**

**Day and Date : Monday, 1 - 04 - 2019**

**Total Marks : 100**

**Time : 3.00 p.m. to 6.00 p.m.**

- Instructions :**
- 1) Attempt in all five questions.
  - 2) Answer to the all questions must be written in the same answer book.
  - 3) Figure to the right indicate marks.

**Q1) Answer the following (any four):** [20]

- a) Explain non classical carbocation.
- b) Explain the catalytic cycle of Suzuki reaction.
- c) Explain the photochemistry of vision.
- d) Explain concept of alternant and non - alternant hydrocarbons.
- e) Mention the applications of crown ethers.
- f) Write a note on detection of free radicals by ESR spectroscopy.

**Q2) a) What are ylides? Give the preparative methods and synthetic utility of phosphorus ylides?** [10]

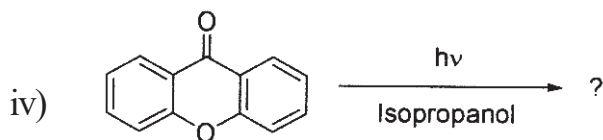
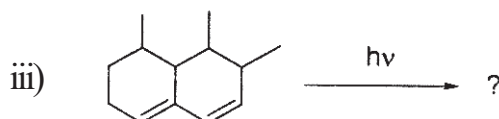
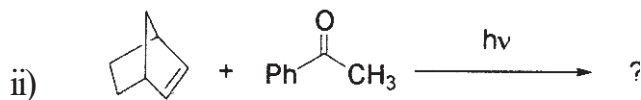
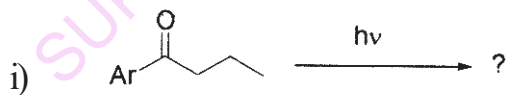
- b) Discuss the following reactions. [10]
  - i) Favorskii reaction
  - ii) Baeyer - Villiger oxidation

OR

- a) Explain the formation, stability and reactivity of carbenes. [10]
- b) Discuss the following reactions. [10]
  - i) Chichibabin reaction
  - ii) Michael reaction

**P.T.O.**

- Q3) a) Describe Norrish type II reactions in details. [10]  
 b) Give the products of the following photochemical reactions with mechanism. [10]

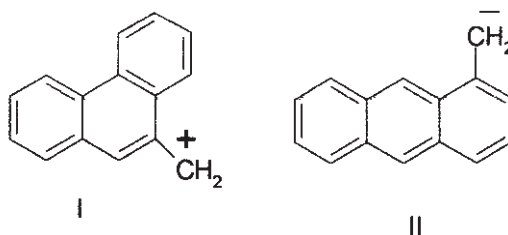


OR

- a) Explain Paterno - Buchi reaction. [10]  
 b) Write notes on: [10]  
 i) Cis-trans isomerization  
 ii) Photo-Fries rearrangement
- Q4) a) Using perturbational molecular orbital (PMO) theory, calculate the reactivity index (NE) when naphthalene undergoes SE reactions at position 1 and 2. [10]  
 b) i) Calculate the delocalization energy in the following. [5]

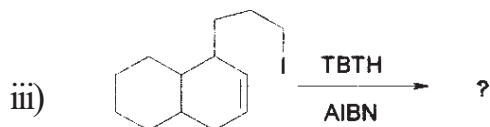
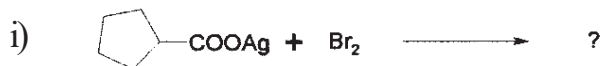


- ii) Determine the charge density in the following. [5]



OR

- a) Explain the following reactions giving suitable mechanism: [10]  
 i) Acyloin condensation.  
 ii) Sandmeyer's reaction.
- b) Predict the products giving suitable mechanism. [10]



- Q5) a) Give an account on the structure and properties of ferrocene. [10]  
 b) Write a note on. [10]  
 i) Fullerenes  
 ii) Annulenes

OR

- a) Give an account on the various methods of preparation of tropylium salts. [10]  
 b) Write a note on. [10]  
 i) Auto-oxidation  
 ii) Hunsdiecker reaction



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**M.Sc. (Part - II) (Semester - III) Examination, November- 2018**  
**ORGANIC CHEMISTRY (Paper - IX)**  
**Organic Reaction Mechanism (CBCS)**

**Sub. Code : 60840**

**Day and Date : Thursday, 22 - 11 - 2018**

**Total Marks : 80**

**Time : 10.30 a.m. to 01.30 p.m.**

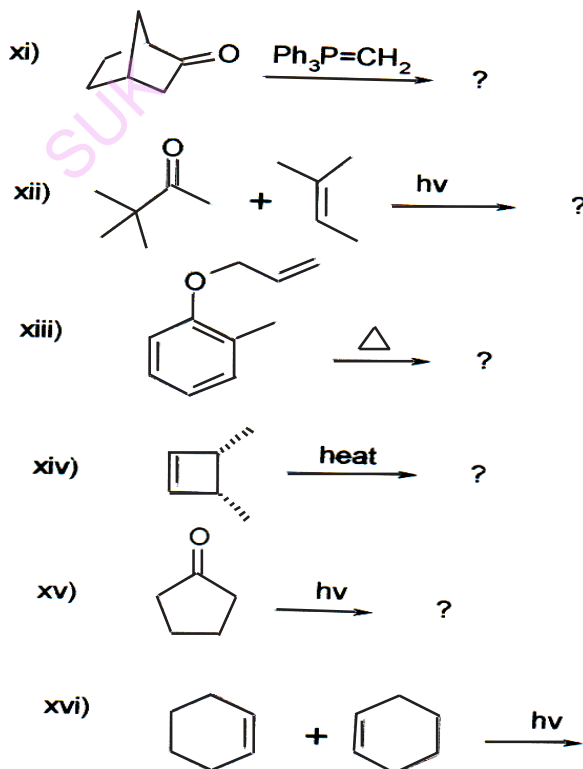
- Instructions :**
- 1) Attempt in all five questions.
  - 2) Question No. 1 is compulsory.
  - 3) All questions carry equal marks.
  - 4) Answer to the all questions (Section - I and II) must be written in the same answer book.
  - 5) Figures to the right indicate full marks.
  - 6) Attempt at least two questions from Section-I and any two questions from Section - II.

- Q1) A) Answer the following (One mark each). [16]**
- i) Mention any two photosensitizers.
  - ii) What is cope rearrangement?
  - iii) What is Inter System Conversation?
  - iv) Define singlet oxygen.
  - v) Which reaction can be used to prepare lactones?
  - vi) What is isotope labelling?
  - vii) What are sigma ( $\sigma$ ) values?
  - viii) Enlist the types of pericyclic reactions.
  - ix) Which factors decide the stereochemistry of electrocyclic reactions?
  - x) Define activated complex.

**P.T.O.**



B) Write the products:



**SECTION-I**

**Q2)** Give an account on various non kinetic methods of determining reaction mechanism. [16]

**Q3) a)** Give the preparative methods and synthetic utility of sulfur ylides? [8]

b) Explain the following reactions. [8]

i) Dienone-Phenol rearrangement.

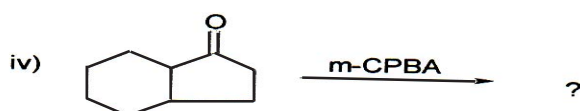
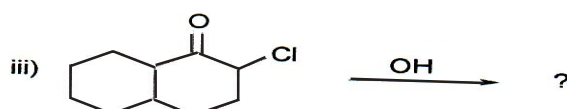
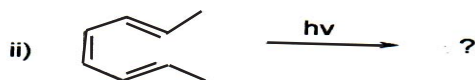
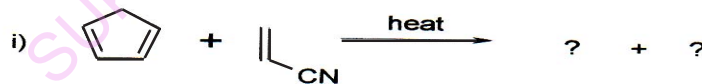
ii) Favorskii reactions.

**Q4) a)** State and explain Woodward Hoffmann rules of the conservation of orbital symmetry for electrocyclic reactions. [10]

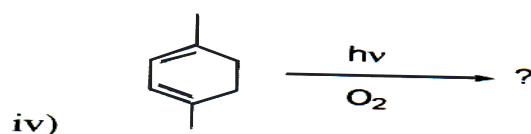
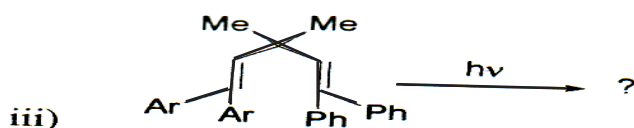
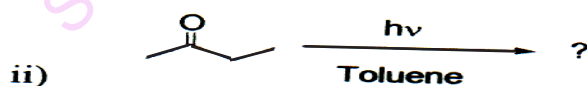
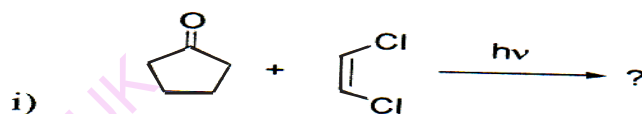
b) Explain [3,3] sigmatropic rearrangements. [6]

SECTION-II

- Q5)** a) Describe Paterno-Buchi reactions. [8]  
 b) Write the products of following reactions with mechanism. [8]



- Q6)** a) Give a brief account no Norrish type II reactions. [8]  
 b) Give the products of the following photochemical reactions with mechanism. [8]



- Q7)** Short notes: (any four) [16]  
 a) Cycloaddition reactions.  
 b) Phosphorus ylides.  
 c) Hammett equation.  
 d) Kinetic isotope effect.  
 e) Photochemical cis-trans isomerization.

